Adding Colinear Vectors

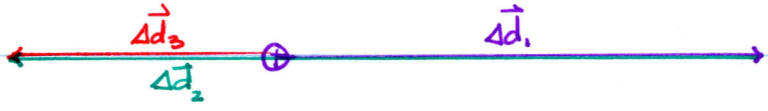
#1 $\Delta\vec{d}_1 = 13\text{km [E]}$ — Camper's 1st displacement

$\Delta\vec{d}_2 = 20\text{km [W]}$ — Camper's 2nd displacement

Solving By Means of: A Vector Diagram

1cm = 2 km

↑N



$\Delta\vec{d}_3$ = Resultant Displacement

= 7 km [W]

Solving By Means of: A Mathematical Solution

The total displacement, while representing the change in positions, is also equivalent to the sum of the individual displacements. The final position, relative to the start, can be determined in the same fashion:

$\vec{d}_f = \Delta\vec{d}_f = \Delta\vec{d}_1 + \Delta\vec{d}_2$

$= 13\text{ km [E]} + 20\text{ km [W]}$

$= 13\text{km [E]} - 20\text{km [E]}$

$= -7\text{ km [E]}$

$= +7\text{ km [W]}$

Colinear vectors but opposite directions

∴ Must invert one to make directions the same

(c) Distance = Δd = total length of path travelled

= 13 km + 20 km

= 33 km

#2

[N45°E] IS COLINEAR TO [S45°W]

$\Delta\vec{d}_R = \Delta\vec{d}_1 + \Delta\vec{d}_2$

$= 4.0\,km\,[N45°E] + 6.0\,km\,[S45°W]$

$= 4.0\,km\,[N45°E] - 6.0\,km\,[N45°E]$

$= -2.0\,km\,[N45°E]$

$= +2.0\,km\,[S45°W]$

#3 $\vec{d}_1 = 2.1\,m\,[S]$ of hack

$\vec{d}_2 = 9.7\,m\,[S]$ of hack.

$\Delta\vec{d}$ = change in position

$= \vec{d}_2 - \vec{d}_1$

$= 9.7\,m\,[S] - 2.1\,m\,[S]$

$= 7.6\,m\,[S]$

NO NEED TO INVERT VECTORS AS THEY ARE BOTH IN SAME DIRECTION

#4 $\vec{d}_f$ = SUM OF INDIVIDUAL DISPLACEMENTS

$= 4.0\,km\,[E] + 5.0\,km\,[N] + 7.0\,km\,[W] + 6.0\,km\,[S]$

COLINEAR

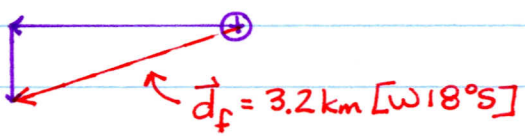
COLINEAR

$= 3.0\,km\,[W] + 1.0\,km\,[S]$

VECTORIALLY

1 cm = 1 km

N



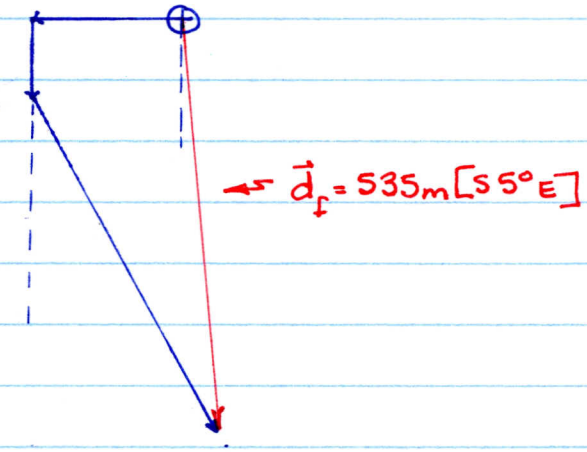
#5 $\vec{d}_f = 200\,m\,[W] + 100\,m\,[S] + 500\,m\,[S30°E]$

- none of these vectors are colinear

∴ scale diagram with vectors added tip to tail

1 cm = 100 m

N ↑



#6

SEGMENT	DISTANCE	POSITION REL. TO "A"	DISPLACEMENT DURING CHOSEN SEGMENT
AB	28m	15.2m [E]	15.2m [E]
BC	14m	17.6m [N61°E]	8.4m [N] ← FROM "B" TO "C"
CD	30m	27.6m [N48°E]	11.6m [N26°E]
AC	42m	17.6m [N61°E]	17.6m [N61°E]
AD	72m	27.6m [N48°E]	27.6m [N48°E] ← FROM "A" TO "D"

Hmmm .... WHAT WOULD THE ABOVE VALUES BE FOR SEGMENT "BD"?

44m 27.6m [N48°E] 19.2m [N15°E]

- if you were able to get these answers then you understand the concepts.

FOR #9, 10 ← follow the concepts in questions 1-5